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CONTRIBUTIONS TO THE STRATIGRAPHY OF THE ALLEGHENY SERIES IN COLUMBIANA AND MAHONING COUNTIES, OHIO

PART II. THE STRATIGRAPHY OF THE MIDDLE KITTANNING COAL BETWEEN GREENFORD AND WASHINGTONVILLE, OHIO

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The Kopp Klay Kompany has a small plant for the manufacture of building tile at Greenford in Green Township, Mahoning County, Ohio. This plant is located about 0.6 of a mile east of the Greenford square on the south side of the road and on the west side of the Niles and Lisbon branch of the Erie Railroad. (See Figure 1.)

Formerly the clay used for making the tile came from a now abandoned mine at the plant. This mine, which was opened many years ago by Andrew Reichstadt, will be herein called the Reichstadt mine. It has long been a matter of dispute among geologists and local miners whether the clay used in this tile plant is the underclay of the Lower of Middle Kittanning coal. Some believe that it is the Lower Kittanning clay, others are equally certain that it is the Middle Kittanning clay, and still others are uncertain as to which of the Kittanning clays it is.

I talked recently with a son of Andrew Reichstadt who was able to tell me that the mine was opened about 75 years ago but was unable to give me much information concerning the mine. The oldest possible written mention of this mine and at that a very uncertain one was made in 1878 by Newberry, who wrote as follows:[1]

"In the east part of the Township (Green), Coal No. 4 has been opened on the farms of Reichstahl and Roller but is not now worked."

It is entirely possible that Newberry misspelled the name Reichstadt and that the location mentioned is the mine in question, but the different spelling of the name and the uncertainty of the exact location are only suggestive at best. Newberry's Coal No. 4 is now known to be the Middle Kittanning coal in this vicinity.

Orton was the next geologist to visit the locality under consideration, and there is no question that the Reichstadt mine was in operation at that time. He wrote as follows:[2]

"A mile and a half south . . . at Green Station, the Lower Kittanning coal makes its first appearance. . . . It has been mined here by Andrew Reichstadt on section 23. It lies about 15 feet above the railroad. . . .

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[1]Newberry, J. S.: *Report on the Geology of Mahoning County*, Geol. Surv. Ohio, Vol. III, p. 812. (1878.)

[2]Orton, Ed.: *The Stratigraphical Order of the Lower Coal Measures of Ohio*, Geol. Surv. Ohio, Vol. V, pp. 32–33. (1884.)

"The (Lower) Kittanning coal can be followed from Green Station to the southward along the valley of the Cherry Fork, without difficulty. It falls a little faster than the valley, so that at the Walters Mine, section 35, Green township, it lies about level with the railroad."

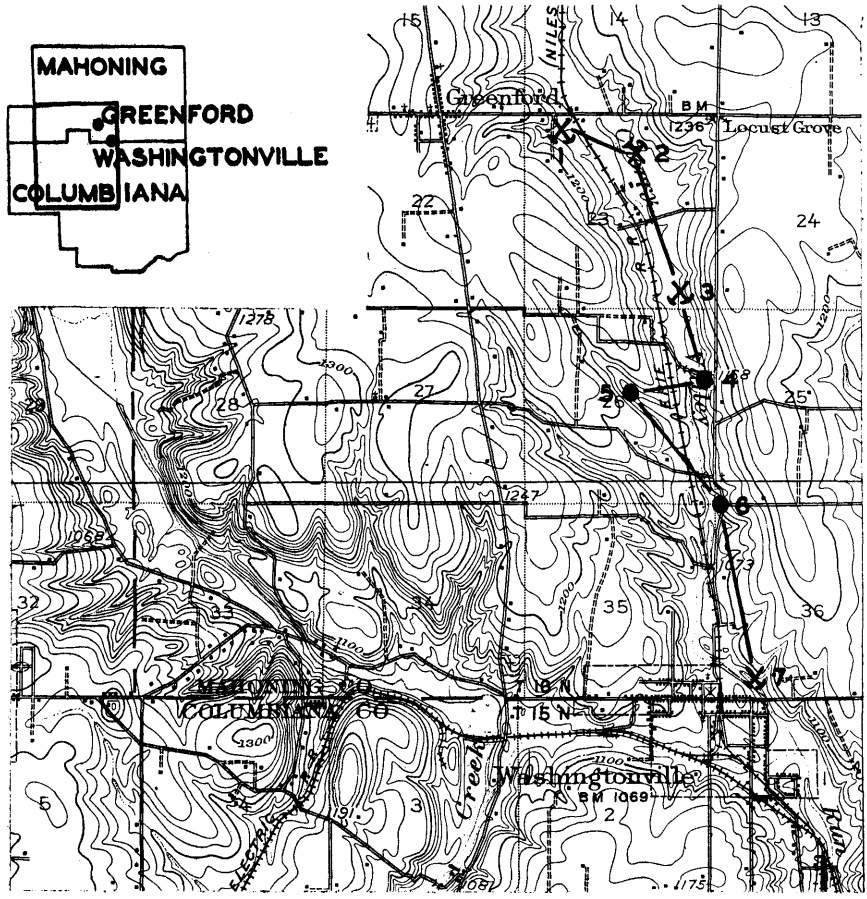

FIG. 1. Portion of the Lisbon Quadrangle showing the location of Greenford and Washingtonville and the localities at which the Middle Kittanning coal and associated strata were studied. Inset shows an outline map of Mahoning and Columbiana Counties, the area within the Lisbon Quadrangle, and the location of Greenford and Washingtonville.

1. A. Reichstadt Mine.
2. M. A. Less Mine.
3. C. J. Roller Prospect Pit.
4. M. and L. Schnurrenberger Exposure.
5. E. R. Kurtz Exposure.
6. M. Roller Exposure.
7. J. A. Stouffer Mine.

Although Orton called this coal the Lower Kittanning, three miles further south at Washingtonville the Lower Kittanning coal with which he correlated the Reichstadt coal has been shown by Stout and Lamborn to be the Middle Kittanning coal.[3]

No detailed section of this mine was published until 1923, when Stout wrote as follows:[4]

"At Greenford, Green Township, the same members are worked by the Kopp Klay Kompany for the manufacture of building block. The beds are reached by a slope. A record taken in the mine follows:

Shale
Coal, *Lower Kittanning*.....2′ 3″
Clay, light, lower part siliceous, *Lower Kittanning*.....7′ 0″
Shale, siliceous.

"The thickness of the clay varies from 6 to 8 feet, but averages about 7 feet. The overlying coal is of fair quality and is used in manufacturing the clay into ware. The clay is above drainage along the main valleys in the southern part of the county, but owing to the thick covering of drift it is seldom well exposed for measurement. The quantity of material available, however, appears to be large."

Lamborn gives an almost identical section in a recent report.[5]

As can readily be seen from reading the above there have been different opinions of the correlation of the coal and clay in the Reichstadt mine. Orton and possibly Newberry believed them to be the Middle Kittanning members, and more recently Stout and Lamborn have identified them as the Lower Kittanning members. The mine is now abandoned and cannot be restudied at present.

In 1939 I visited a new mine which had been opened at approximately the same level and presumably on the same coal and clay almost directly across the valley on the east side of Cherry Valley Run on the Mary A. Less farm in the northeast quarter, Section 23, Green Township, Mahoning County. The rocks in this new mine, herein called the Less mine, were studied at that time, and the section of the strata is as follows:

9.	Sandstone: gray, massive or bedded, fine grained, exposed, *Lower Freeport*		6′ 0″
8.	Shale: gray, slickensided		2′ 6″
7.	Shale: dark gray, pyritiferous, nodular, fossiliferous	*Washingtonville*	0′ 5″
6.	Shale: black, bony, sparingly fossiliferous		1′ 6″
5.	Shale: gray, slickensided; with clay ironstone concretions		4′ 6″
4.	Shale: black, bony, fossiliferous		0′ 9″
3.	Coal: bony, resembles cannel coal	*Middle Kittanning*	0′ 6″
2.	Coal: with thin irregular marcasite partings		2′ 0″
1.	Clay: light gray with a few inches of dark clay at base of the coal at most places in the mine, plastic; with lenses of light gray, fine, compact sandstone up to 1 foot in thickness, exposed		10′ 0″

From a comparison of the above section with the local lithology of the Lower and Middle Kittanning coals and their associated strata it was reasonably certain that these were the Middle Kittanning coal and clay. The strata associated with the Kittanning coals in this vicinity normally have such a different lithology

[3]Stout, W., and Lamborn, R. E.: *Geology of Columbiana County*, Geol. Surv. Ohio, 4th series, Bull. 28, pp. 158-159. (1924.)

[4]Stout, W. et al.: *Coal Formation Clays of Ohio*, Geol. Surv. Ohio, 4th series, Bull 26, p. 332. (1923.)

[5]Lamborn, R. E.: *The Coal Beds in Southeastern Mahoning County*, Geol. Surv. Ohio, 4th series, Bull. 43, p. 30. (1942.)

and succession that each can be readily recognized at most places. The following is a complete and composite section illustrating the local stratigraphy of these two coals and associated strata:

17.	Sandstone, *Lower Freeport.*		
16.	Shale: gray; with clay ironstone concretions, thickness variable		6′ 0″
15.	Shale: black, bony, fossiliferous, marine, *Washingtonville*		1′ 6″
14.	Shale: dark gray; with clay ironstone concretions, thickness variable		3′ 6″
13.	Coal, *Middle Kittanning*		2′ 4″
12.	Clay: gray, plastic, siliceous		1′ 6″
11.	Limestone: gray, nodular, ferruginous, freshwater, *Salem*		1′ 0″
10.	Clay: very local, *Oak Hill*		2′ 0″
9.	Shale and (or) sandstone		30′ 0″
8.	Shale: gray, fossiliferous, marine	*Hamden*	4′ 0″
7.	Shale: gray to gray-black, fossiliferous, marine; with nodular fossiliferous limestone; locally with cone-in-cone	*Hamden*	0′ 10″
6.	Shale: black, bony, fossiliferous, brackish or marine	*Hamden*	0′ 8″
5.	Coal, *Lower Kittanning*		3′ 0″
4.	Clay: gray, plastic		2′ 6″
3.	Coal: impure, locally absent, *Lawrence*		1′ 8″
2.	Clay: gray, plastic		8′ 0″
1.	Shale and sandstone		25±′

The following features of the section in the Lees mine suggest the Middle Kittanning members:

(1) The presence of the sandstone, zone 9.
(2) The presence of the fossiliferous shale, zones 6 and 7.
(3) The presence of shale with clay ironstone concretions, zone 5.
(4) The absence of a nodular marine limestone, zone 7 in the above composite section.
(5) The absence of an impure coal in the underclay, zone 3 in the above composite section.
(6) The thickness of the coal, zones 2 and 3.

On the other hand, some of the features of the same section are indicative of the Lower Kittanning members:

(1) The presence of black, bony, fossiliferous shale immediately overlying the coal, zone 4.
(2) The presence of cannel coal on top of the bituminous coal, zone 3.
(3) The absence of the nodular freshwater limestone at the base of the Middle Kittanning underclay, zone 11 of the composite section.
(4) The thickness of the underclay, zone 1.

Unfortunately none of these evidences is positive proof of either member; for exceptions are ever the rule in the lithology and stratigraphy of the coal measures. For example, the distribution of both the Salem and Washingtonville members is irregular, and there are localities where fossils are in the layers immediately on top of the Middle Kittanning coal as occur in Section 26, Perry Township, Columbiana County and at Teegarden in Section 32, Salem Township, Columbiana County.[6] There is still another means of checking the identity of these members.

[6]Sturgeon, M. T.: *The Stratigraphy and Paleontology of the Middle Portion of the Allegheny Formation of the Lisbon (Ohio) Quadrangle*, Master's Thesis, Ohio State University, pp. 40 and 47. (1933.)

Both Kittanning coals are definitely known and were formerly extensively mined in the vicinity of Washingtonville, which is distant from the Less mine about three miles south and a little east along Cherry Valley Run. There the Lower Kittanning coal is below drainage but was seen in one mine which was in operation in 1939 on the east side of Cherry Valley Run in the southwest corner of Section 36, Green Township, Mahoning County. The old Middle Kittanning mines are abandoned, but in spite of slumped debris this coal can still be seen at several places. A small mine on the J. A. Stouffer property which is nearby to the above Lower Kittanning mine, was studied by Stout and Lamborn and is the type section of the Washingtonville shale. The Middle Kittanning coal is no

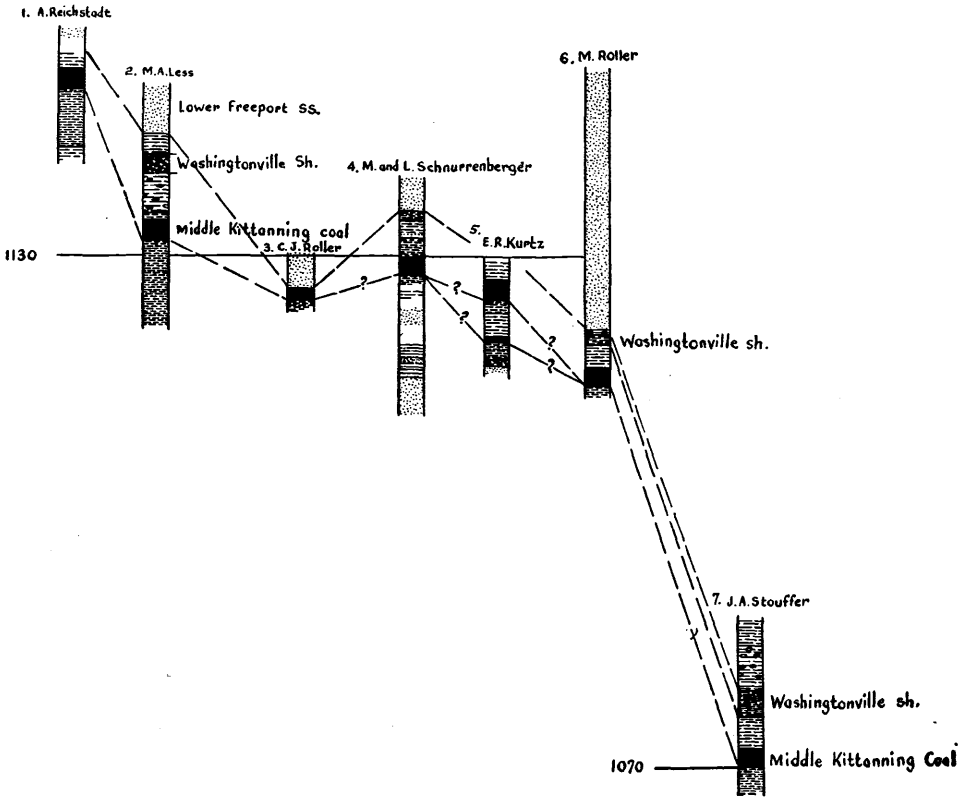

FIG. 2. Correlation diagram of the Middle Kittanning coal and associated strata between Greenford and Washingtonville, Ohio

longer exposed at the Stouffer mine, but the Washingtonville shale is still visible, and the position of the coal can easily be determined from Stout and Lamborn's published section.

Along the east side of Cherry Valley Run between the Less mine at Greenford and the J. A. Stouffer mine at Washingtonville are a number of locations where the Middle Kittanning coal can be seen or has been prospected or mined. The level of the coal can be traced with reasonable certainty from one location to another, although several of the mines and prospect pits are so covered with debris and vegetation that the strata cannot be seen. All the localities at which the Middle Kittanning coal is exposed on the east side of Cherry Valley Run between Greenford

and Washingtonville have been studied and plotted graphically in an attempt to determine the true identity of the coal and clay in the Less mine. The descriptions of these localities, all of which are in Green Township, Mahoning County, are given below. The map shown in Figure 1 illustrates the relative position and the chart shown in Figure 2 gives the lithologic and stratigraphic relationships of the above localities.

The first of these localities is at Washingtonville in the now abandoned J. A. Stouffer mine in the southwest quarter of Section 36. This is the section described by Stout and Lamborn as the type for the Washingtonville shale, and their section is quoted below.[7]

	Feet	Inches
Shale, gray	3	0
Shale, gray, with ore nodules	4	0
Shale, with two layers of iron ore	...	8
Shale, gray	...	8
Shale, bony, carbonaceous, fossiliferous, *Washingtonville*	3	0
Shale, dark, fissile, siliceous	3	8
Coal, *Middle Kittanning*	2	4
Clay, siliceous	3	0

The next exposure is about a mile north of Washingtonville along the Washingtonville-Canfield road. Here just south of the old schoolhouse in Section 25 this north-south road was changed several years ago, and the following strata were exposed: (See Figure 3.)

6.	Sandstone: light gray, fine, micaceous, cross and irregularly bedded; with streaks of coal, plant fossils and clay ironstone concretions, base irregular, exposed, *Lower Freeport*	30′	0″
5.	Shale: dark gray; with numerous small clay ironstone nodules	0′	6″
4.	Shale: black, bony, sparingly fossiliferous, *Washingtonville*	1′	1″
3.	Shale: light gray	2′	8″
2.	Coal, *Middle Kittanning*	2′	2″
1.	Clay: light gray, plastic, exposed	1′	0″

This section, herein called the M. Roller section, is no longer well exposed, and the top of the Middle Kittanning coal which was formerly exposed on the east side of the road opposite the May Roller farm buildings cannot be seen at present. However, the coal rises rather sharply to the northward toward the old schoolhouse, and from the now covered exposure in the roadside ditch opposite the Roller buildings it rises 21 feet in a distance of 500 feet toward the schoolhouse, and at that point the Middle Kittanning coal can still be dug out on the east side of and just above the road level.

The Washingtonville shale is well exposed and typical in lithology but only sparingly fossiliferous. The other associated strata are thinner than at Washingtonville but the principal difference is the presence of the base of the Lower Freeport sandstone only a little over four feet above the top of the Middle Kittanning coal.

The next exposure is about 0.6 of a mile further north on the west side of the Washingtonville-Canfield road. Here a road formerly joined the north-south road from the west at an elevation of 1168. The exposure, herein called the Schnurrenberger section, is in a small ravine that parallels the abandoned road and leads westward to Cherry Valley Run:

[7]Stout, W. and Lamborn, R. E.: *Op. cit.*, pp. 159 and 177, (1924.)

FIG. 3. A. Lower Freeport sandstone and Washingtonville shale (at hammer) on east side of Washingtonville-Canfield road opposite M. Roller farm buildings.

FIG. 3. B. Lower Freeport sandstone and Middle Kittanning coal (at arrow) in prospect pit on C. J. Roller farm.

8.	Sandstone: gray, thin-bedded, fine, friable, exposed, *Lower Freeport*.....		3′ 6″
7.	Clay: gray-buff, plastic.....		1′ 0″
6.	Shale: gray-buff, soft but arenaceous; with 5-inch layer of sandstone near base.....		2′ 0″
5.	Clay: with dark shaly layers.....		2′ 4″
4.	Coal: shaly.....	*Middle Kittanning*	0′ 5″
3.	Coal: good.....		1′ 6″
2.	Clay, shale and sandstone: this is largely a covered interval.....		12′ 0″
1.	Sandstone: gray, medium, massive, friable; with some plant fossils, exposed.....		4′ 0″

The elevation of the Middle Kittanning coal is 1128 here, and at the M. Roller section the same coal varies from 1115 to 1136. This section is a little unusual in the clay or clay-shale above the coal and in the absence of the Washingtonville shale. Almost due west of this on the west side of Cherry Valley Run on the E. R. Kurtz farm in the north-central part of Section 26 is the following section:[8]

8.	Shale: gray-black, weathered, exposed.....	2′ 0″
7.	Coal, *Middle Kittanning*.....	2′ 3″
6.	Clay: gray, plastic, carbonaceous.....	1′ 7″
5.	Shale: gray-black, carbonaceous, siliceous.....	2′ 9″
4.	Coal.....	0′ 4½″
3.	Coal: shaly.....	0′ 5″
2.	Clay: gray, plastic; with a 6-inch layer of clay ironstone concretions one foot above the base, *Salem?*.....	2′ 8″
1.	Sandstone at creek level.	

Here the elevation is between 1120 and 1130. This exposure which is only about one-half mile southwest of the Schnurrenberger exposure suggests an alternative interpretation to that section. The coal called the Middle Kittanning coal in the Schnurrenberger section may be the lower coal, zones 3 and 4, on the Kurtz farm. If this interpretation is the true one, then it is probable that the Lower Freeport sandstone displaces both the Washingtonville shale and the Middle Kittanning coal at the 1168 road intersection and the plastic clay overlying the coal in that section is really the Middle Kittanning underclay. Also if that is the case, then the coal in the Schnurrenberger section and the lower coal in the Kurtz section probably are the local coal (Strasburg) above the Oak Hill clay. The Oak Hill member belongs in the interval between the Salem and Hamden members and is absent at most places in this vicinity.

In the wood lot on the east side of Cherry Valley Run on the C. J. Roller farm in the southeast quarter of Section 23, the Middle Kittanning coal has been prospected and the section of the exposed strata is as follows: (See Figure 3.)

3.	Sandstone: gray-buff, bedded, micaceous, exposed, *Lower Freeport*.....	4′ 0″
2.	Coal, *Middle Kittanning*.....	1′ 6″
1.	Clay: gray-buff, plastic, exposed.....	1′ 0″

The approximate elevation of the Middle Kittanning coal here is 1125. The base of the Lower Freeport sandstone rests directly upon the Middle Kittanning coal, and this relationship probably accounts for the thinness of the latter member. Along this slope the position of the base of the Lower Freeport sandstone and

[8]Sturgeon, M. T.: *Op. cit.*, pp. 38–39.

presumably the position of the Middle Kittanning coal is marked by several springs, and a half mile further north at the C. J. Roller buildings there is an abandoned mine. The coal is no longer visible, but several feet of thickness of the Lower Freeport member can be seen. The elevation of the coal here is approximately 1120. It is less than half a mile from the C. J. Roller buildings to the Less mine from which the clay is taken at present for the Kopp Tile plant and which was described previously in this report. The elevation of the Middle Kittanning coal in the Less mine is probably between 1130 and 1135. In the two ravines between the C. J. Roller farm buildings and the Less mine the Lower Freeport sandstone is well exposed with an exposed thickness of about 75 feet.

From the available evidence in the field the uncertain coal and clay in the Less mine can be traced along the east side of Cherry Valley Run without reasonable doubt into the certain Middle Kittanning members at Washingtonville. This is evident not only from similar elevations but also from similar lithology as is shown in Figure 2. There is a sharp drop in the elevation of the coal between the M. Roller and J. A. Stouffer localities, and this might cause some concern over the correlation were it not for the fact that a sharp descent in the Middle Kittanning coal is present at the M. Roller exposure. The Lower Freeport sandstone is a steady member from the Less mine south as far as the road cut opposite the M. Roller section. It varies in position from a few feet above the Middle Kittanning coal to resting directly upon or even cutting out and replacing that coal. The base of this sandstone is a disconformable one. This relationship of the Lower Freeport sandstone accounts for the absence of the marine Washingtonville shale at several of the described localities. Fortunately the Washingtonville member is present not only in its type section at the J. A. Stouffer mine but also along the road opposite the M. Roller buildings and in the Less mine itself.

That brings us back to the original problem—the identity of the coal and clay in the old Reichstadt mine at the Kopp Klay plant. To the evidence already presented concerning this mine from the written reports of Orton, Stout, and Lamborn, a few additional facts can be added. Mr. Ira Wisler, who was a miner for a number of years in the Reichstadt mine, has recently informed me that at a close but variable distance above the top of the coal was the base of a heavy sandstone which is undoubtedly the Lower Freeport. He further reported a few inches of black "slate" on top of the coal, and concerning this "slate" Orton wrote as follows:[9]

"There are 2½ feet of bituminous coal, overlain with 4 to 6 inches of cannel."

The same is present in the Less mine where it is six inches thick. The underclay which had a thickness of ten or more feet was without any trace of a second layer or even streaks of coal but did contain at least locally some nodules of presumably clay ironstone or limestone larger than the size of one's first. The ware made from this clay forms little blisters from iron impurities at 2100° F., but ware made from Lower Kittanning clay from nearby North Lima is without similar blisters when burned at a temperature of 2700° F.

While I have no accurate drill records at or near this mine, the general report is that there is another coal about 40 feet below the coal worked in the Reichstadt mine, which, if true, would be the Lower Kittanning coal.

This great thickness of the clay in both the Reichstadt and Less mines is typical of the Lower Kittanning clay combined with the Lawrence clay, rather than of the Middle Kittanning clay in this vicinity. Orton reported, however, that two and a half miles further south in the old Walters mine the Middle Kittanning clay was seven feet thick.[10]

[9]Orton, Ed.: *Op. cit.*, p. 33.

[10]Idem., p. 33.

The elevation of the coal in the Reichstadt mine has not been accurately determined, but Orton wrote that it was 15 feet above the Erie Railroad, which would make it a few feet higher than it is in the Less mine across the valley.

All the available evidence concerning the Reichstadt and Less mines convinces me that the Middle Kittanning coal and clay are present in both and that Orton was correct when he correlated the coal in the Reichstadt mine with the Middle Kittanning coal in the vicinity of Washingtonville.

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